HOT IRON #134: August 31, 2026
THE JOURNAL OF THE CONSTRUCTOR'S CLUB

Technical Editor: Please send technical questions and suggestions **to Peter, G6NGR**
Content and Distribution: Send ideas for content or subscriptions **to Frank, W4NPN**

Hot Iron Library of issues (.pdf's) **Hot Iron Technical Library**

Hot Iron Index: subjects and issues

Our wonderful hobby includes those with a great deal of electronic knowledge as well as those just beginning their journey. Some prefer digital modes and projects, others prefer analog projects and devices that glow in the dark. Our quarterly newsletter, begun by **G3PCJ of Walford Electronics,** tries to publish something for each, while trying to keep the focus on construction of various devices! American spelling is mostly used; sorry, I can't help that, being a Yank.

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Miscellaneous News and items of interest:

* **There is a new kid on the block: HamGpt.** I guess it had to happen. We haven't tried it yet but it apparently is to help with all things Ham. Give it a whirl and let us know what you think! We have no relationship with it.

* **What is Spothole?** Spothole is an aggregator of amateur radio spots from DX clusters and outdoor activity program. It's free for anyone to use and includes an API that developers can build other applications on. For more information, check out the "About" page. If that sounds like nonsense to you, you can visit the FAQ section to learn more.

* **The Long Island CW Club** (in the U.S. State of New York) just announced that its 10,000th member has joined. The club has over 8,400 current CW operators with ten thousand having registered during its history. A distribution by country is not given, but that's a lot of CW operators!

* **A long-time ham has donated One Million dollars to the ARRL** in direct support of its programs and activities.

* **Walford Electronics (Somerset, England) has announced "The Pipper."** This small kit provides tuning marker signals at switch selectable frequencies of either 500 or 100 khz. It is used to calibrate the dial of a receiver having no digital readout.

An interesting Antenna Matching Unit was also noted on the Walford site. This AMU seems especially suited to QRP operations. Shipping these kits abroad is no longer available due to the burden imposed by government trade requirements.

* **KJ4WLC's "Ops Data for the Air" website** provides lots of operating info right to your browser: Live APRS, DX spots, Band Conditions, Satellites and a HamClock alternative.

* **HF Pilot: "Your Co-Pilot for HF Propagation"** is intended to do for shortwave/HF radio what RepeaterSTART revolutionized for repeaters: Get propagation data, EVEN OFFLINE, install on your computer and know what hour to tune your radio, and connect with operators around the world. It's a download for Windows or Linux devices.

* **Variable Mu Tubes? Remote cut-off Pentodes? What's in a name? Peter explains.**

* ARRL has a new book: "Digital Networking for Ham Radio." This will be of interest to some; it's available from **the ARRL website.**

* **Speaking of books: The Bipolar Transistor Cookbook, Parts 1-8, is available.** Click the link to find the articles.

* **This QRP website** has a lot of information and a list of QRP clubs; check out the sidebar!

* The **Amateur Radio News and Notes website** has many interesting articles. Visit the "Archives" section to read all editions.

PROJECTS and CONSTRUCTION

* VA3KOT has been busy. **As we head into the sunspot cycle's downward slide, VA3KOT** has a lengthy article about antennas to combat the loss of easy DX. The main idea is to achieve a low take-off angle so that the signal will "bounce" off one of the ionized layers as far from your station as possible, thereby obtaining the longest "skip" distance.

VA3KOT has another antenna idea, using twinlead to create a 15 foot (~4.6 meters) vertical antenna that covers 40 and 20 meters. A POTA idea? Find the article, and much more, on his website.

* **An SWR project and thorough explanations, from N0CU**. I frequently speak to hams who have no real understanding of forward and reflected power, SWR and what happens to their RF once it leaves their xmtr. This .pdf explains Forward and Reflected power, SWR measuring techniques and more. Build a three-meter device: Fwd, Ref and perhaps a field strength meter or power meter, all in one case? Or just build one item?

Also, **scroll down to the end of this web page link** to find helpful articles about SWR.

* **The WB4KDI "Upside Down" Low Voltage Power supply.** When building a low voltage (13 – 15 volt) linear power supply to power equipment, the pass transistors must frequently be insulated from the heat sink since they are in the positive lead. This complexity is avoided by putting them in the negative lead and bolting them directly to the heat sink, which can sometimes be the chassis or back panel of the supply itself. It greatly simplifies the construction of the supply and no additional cooling is usually needed. This is an old design that merits a repeat so here it is. W4NPN has been using one for over twenty years without a failure. The heavy bottom plate of the case is the heat sink. The article can be found in the middle column of links on the web page.

* VFO's: W4NPN began researching home-brew tube vfo's a year ago but only recently began to build one to feed an old design 6AG7-807 cw/am transmitter. If I can get the thing to work properly I'll report the final Clapp-style high stability circuit's results. Meanwhile, Tim Walford's comments about homebrew VFO projects are excellent and are paraphrased below:

Buffer stages after a VFO are certainly desirable but another often overlooked aspect in home designs, is feedback from the PA's output circuit currents/fields into the RF zone surrounding the VFOs inductors. i.e. build large and leave the VFO always running as you mention!! This feedback is often the root cause of chirp in CW analogue rigs or FMing in DSB rigs. After that we are into the thermal characteristics of Ls and Cs if the construction is good mechanically. The luxury of avoiding a 'ground-planed' PCB board is not always needed and (I suspect) is not as troublesome until the wanderings due to individual parts has been well controlled. Frequency doubling or trebling is often the cure to avoid this chirp/FMing aspect for direct conversion designs. As mentioned to Frank yesterday, I was messing about with an open build where I could blow on individual parts and see how quickly they reacted. It shocked me how awful film trimmers were and how good TOKO style canned inductors were! I had previously used N150 capacitors routinely with nearly all my recent VFO designs but found it better to use so called Class 1 caps which are/used to have the older COG/NPO designation (with black flashes as opposed to the red flash of N150 or purple of the dangerous N750 types!). My trial showed that a small positive temp coefficient might help if you could get them (I think they were red+violet for P100 and dark grey for P33 according to some web data), but I have failed to find any mention/source of them in any of the regular suppliers that I use. I suspect there are also huge tempco variations in what different types/forms of inductors are used. I recall that the man at Spectrum in Dorchester (whose devices we often have to use in UK) also maintained that age/mild temp cycling (I suspect after core adjustment) seriously improved them too! If we could find/devise some modern capacitive trimming approach to go with toroids (where there is tempco data available) that would be a great help.

And here are some more comments, from Peter Thornton, regarding building VFO's:
"I bet your "old LM-8 Heterodyne Frequency Meter (Ca 1941) and the Hammarlund" are built solid, heavy and careful mixture of steel, brass and aluminium? Those designers knew how to make things stable by virtue of mechanical design (thinking back to the HP VHF oscillator on a 70MHz Ft measuring jig) as well as component selection, multiple parallel design and placement away from 'hot' bits like psu's, buffer amplifier stages, etc. There's no substitute or instant fix for designs that have evolved Darwin style over many years of design.

Another thing I was taught included electrolytics shifting in voltage / value when run on lower-than-maximum voltage: they do shift in value as the insulating layer adapts to the lower demand placed

upon it. I've never seen a graph or description of how this shift develops being doubtless non-linear, or in sudden jerks as the insulating layer's thinnest bit thickens first (or last?) Who knows? And does this adaptation also extend into ceramics, micas, NP0's, *et al*?"

* Daniel, VE7LCG, has submitted several articles, the first of which is linked here. This one discusses **Adjusting the power through ALC for YAESU FT-710 for FT8 working.** It is likely applicable to other rigs as well.
Daniel has written so many ham radio articles that the simplest way to include them was to import them into the website and use a dedicated page, with a link to it on the "Resources" page. All his articles will be put on the website soon, so "stay tuned." More about these in the November NL.

* **Spark Gaps protect the transmitter's costly Tune capacitor.** An arc in the expensive Tune capacitor can ruin it, so it is good practice to install a Spark Gap in parallel to protect both it and the band switch. In a recent Drake-Group exchange, VE7RF reminds us how to create one. Paraphrasing:

Home brew spark gaps can be made from 6-32, 8-32, 10-32 or 1/4-20 hardware (or European metric equivalents). Be sure to use locknuts to lock the gap once it is set. Where the pair of machine screws face each other, install brass or stainless steel acorn nuts with their domed or semi-domed surfaces facing each other. Sometimes the chassis, an aluminum standoff, or angle aluminum, etc., can be used as one of the surfaces. Set the gap using a feeler gage or other insert and make sure the gap is slightly smaller than the gap between the plates of the Tune capacitor. This way, the spark gap will arc first and protect the Tune capacitor, the Bandswitch, and in some cases, the power supply (your power supply does have a glitch resistor and high voltage fuse installed, right? **Right?**).

N0CU has more comments about this subject: "Arc suppressors are a great concept but the problem with them is knowing how to get the gap set properly. As Jim pointed out, the Ameritron factory had trouble doing this. Every one of their legal limit amps I have worked on had a damaged plate tuning cap due to arcing. One of these amps had the gap set at over 1/2 inch which made it useless. Setting the gap based upon theory is complicated by the fact that breakdown voltage is affected by the shape of the surfaces- sharp surfaces breakdown before flat surfaces. The best way to set the gap is with a current limited, variable high voltage source, however, very few hams have access to one of these. Whenever arcing is experienced an effort should be made to at least verify that the arcing is occurring across the suppressor and not the plate tuning capacitor."
Scroll down in Column 2 of this linked web page to read about this subject.

Nostalgia Department:

* **This 1948 ARRL article describes a very simple but high-stability VFO** developed by J.K. Clapp. It's easy to build and delivers excellent stability. Suggested tubes are 6J5 and 6C4, but one half of a 12AU7, with the second half being a buffer might be ideal. Next, let's replace the tube with a transistor!
McCoy also has a very stable and easy-to-build VFO circuit that uses a 12AU7 as an oscillator/cathod-follower, followed by a 6AU6 buffer/amp. A 6AH6 would provide slightly more output if needed.
Moving into the 1960's, **here are both an NPN Transistor version and an Op-Amp version**. Add your tuning capacitor in series with the inductor and it's a Clapp.

No digital version; sorry but that's an entirely different system.
Google "Clapp oscillator" and an entire evening's reading will be found.
It's very stable which is why it is popular; easy to build also.
See the comments about VFO stability and construction above, in this newsletter.

* ***The Discovery of Radio Waves,*** an article in *Nuts and Volts magazine*, takes us back to the very beginning of our science. The same issue has an article on practical portable magnetic loop antennas.

Trouble-Shooting and Repair Section:

I suspect most of us have needed to find the source of an equipment malfunction, especially with older equipment or during a restoration project. Here, we try to find helpful articles about troubleshooting. This is very much a work in progress so please let Frank know of any good articles you have found, at **fbw4npn@gmail.com**.

* **First, let's understand our digital multimeter so that we use it properly.** This link discusses a Fluke multimeter but the information should be generally applicable.

* **Digital Troubleshooting with Doctor P.** This Youtube video takes you through some basic steps needed to troubleshoot a breadboarded circuit.

* **Digital and Analog troubleshooting, by Elevator World**

* **Basic Logic Gate Troubleshooting**

Troubleshooting Older Analog Equipment:

A Universal Troubleshooting Guide

Troubleshooting Stage-by-Stage (old tube radios)

Riders Servicing Superheterodynes (an old but still valid pub)

Restoration of Valved Communications Receivers

The Duffer's Guide to Valve Set Fault-finding.

CHRS Hints and Kinks

ARRL Servicing Guide, Part 1

ARRL Servicing Guide, Part 2

ARRL Servicing Guide, Part 3

Trouble-shooting Analog Circuits

Antenna Stuff:

* **Go here for an extensive collection of antenna articles and information, courtesy of AC6LA.**

* **Go here for another collection of antenna articles and information, from W4NPN.**

Ham Radio Clubs and Organizations:

Knightlites QRP Association: This North Carolina QRP club meets Sunday nights on or around 3571.5 Khz at 9 pm EST. The link provided here goes directly to their "Links" page where many other QRP clubs can be found. Go to their home page to read more about the club. Go also to **KnightlitesQRP@groups.io** to see what's being talked about!

Burnley & District Amateur Radio Club - MX0STB This club, in Lancashire, currently has 34 members and has recently acquired some surplus gear from another UK amateur.

Raleigh Amateur Radio Society, located in Raleigh, NC, USA, is one of the larger U.S. clubs and holds one of the nation's largest "Hamfests" each Spring. It also holds licensing and training sessions and has a significant public service component.

GQRP low-power club was formed in 1974 by Rev. George Dobbs G3RJV (SK). It is a non-profit organisation run entirely by volunteers to promote **Low Power Radio (QRP)** . Whether you have a ham license or not - everyone is welcome. The **SPRAT** quarterly magazine provides a fascinating read containing articles of varying complexity, from simple test equipment, to fully functioning radio transmitters and receivers. You can join the club from the website and have SPRAT mailed to you. **GQRP also has a YouTube Channel at this link.**

Four States QRP club has ideas and features focused on QRP operations and construction.

The Michigan QRP club has a simple DC Receiver kit which might still be available.

Surrey Amateur Radio Communications publishes a professional grade newsletter every two months. Put a link to it on your desktop!

(Let's get your club listed here - send the information to Frank at fbw4npn@gmail.com!)

Tidbits and Odds and Ends:

* William R. Hepburn runs the **DX Info Centre Tropospheric Ducting Forecast** website which provides six-day tropospheric ducting information and forecasting for those interested in exploring VHF, UHF and Microwave DX through the use of these ducting channels. These have the necessary atmospheric conditions to produce tropospheric bending of the waves, which extends the range of stations well beyond normal limits.

* **AM Broadcast Coverage Night Patterns, for U.S. and Canadian MW stations** (created by NF8M). Pick any MW frequency and see the typical coverage areas. A unique service!

* **Antenna Headings:** VU2NSB provides a handy tool to show compass bearings to "everywhere" once your Maidenhead grid square is entered. **Here is the link to that website and service.**

* **QRPpppp and WSPR allows you to check your antenna's** multi-band transmitting and receiving performance. This article by N2YCH discusses this using available software and common techniques.

* **Searching for a Net? This website by K4HCK helps you to find one in the locality you choose.**

* **Andy's (KB1OIQ) Ham Radio Linux Distribution seeks to gather many ham apps compatible with Linux into one location. This video explains what he has done and continues to do.**

Go to this web page to see Hot Iron's list of known Ham Clubs, Ham Radio Publications and YouTube Channels. Please let us know of additional ones!

The W4NPN website hosts the library of Hot Iron issues and provides ham-related information. A list of website major categories is below:

Hot Iron (library of issues, register)

RF Amplifiers

Antenna Information (Antennas, SWR, Metering, etc)

Baluns, Ununs, etc.

Construction Articles and Ideas

Power Supplies

Resources (many!)

Tuners

VFO's (a compendium of articles about tube and solid state designs)

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